

Table of Contents

1	Introduction.....	1-1
1.1	Purpose and Organization of this Manual	1-1
1.2	Summary of Recent Changes	1-3
1.2.1	California's Energy Crisis and Assembly Bill 970	1-3
1.2.2	Assembly Bill 970 Changes	1-4
1.3	Background.....	1-9
1.3.1	Legal Requirements – The Warren Alquist Act.....	1-9
1.3.2	Benefits of Energy Conservation	1-9
1.3.3	Which Standards Apply? Nonresidential vs. Residential	1-10
1.4	Introduction to the Residential Standards	1-12
1.4.1	Compliance Approaches.....	1-12
1.4.2	Mandatory Measures	1-12
1.4.3	Prescriptive Packages	1-12
1.4.4	Performance Methods.....	1-13
1.4.5	California Climate Zones.....	1-14
1.4.6	Compliance and Enforcement Phases of the Building Process	1-15
1.4.7	How to Comply with the Standards.....	1-16
1.4.8	Compliance Documentation.....	1-18
1.4.9	The Guide to California Home Comfort and Energy Savings	1-22
1.5	Code Decisions: Case Studies	1-24
1.6	Where To Get Help.....	1-27
1.6.1	Publications	1-27
1.6.2	Appliance Certification Information	1-27
1.6.3	Insulation Certification.....	1-28
1.6.4	Training Opportunities.....	1-28
2	Mandatory Measures.....	2-1
2.1	Introduction	2-1
2.2	Insulation	2-2
2.2.1	Certification of Insulating Material.....	2-3
2.2.2	Ceiling Insulation.....	2-4
2.2.3	Loose Fill Insulation	2-7
2.2.4	Wall Insulation.....	2-8
2.2.5	Raised Floor Insulation	2-12
2.2.6	Slab Edge Insulation	2-13
2.2.7	Insulation in Existing Buildings.....	2-15
2.3	Fenestration / Exterior Doors.....	2-16
2.4	Infiltration and Moisture Control.....	2-23
2.4.1	Joints and Other Openings	2-23
2.4.2	Vapor Barrier.....	2-24
2.4.3	Special Infiltration Barrier.....	2-25
2.4.4	Fireplaces, Decorative Gas Appliances and Gas Logs	2-25
2.5	Space Conditioning	2-28
2.5.1	Systems and Equipment Certification, Appliance Efficiency Regulations	2-28
2.5.2	Space Conditioning Sizing	2-30
2.5.3	Setback Thermostats	2-32
2.5.4	Heat Pump Controls.....	2-33
2.5.5	Insulation for Refrigerant Lines in Split System Air Conditioners	2-34
2.5.6	Ducts, Plenums, and Fans.....	2-34
2.5.7	Duct Installation Standards	2-38
2.5.8	Pilot Lights.....	2-42
2.6	Water Heating and Plumbing.....	2-42
2.6.1	Equipment Certification	2-43
2.6.2	Water Heater Tank Insulation	2-44

2.6.3	Pipe Insulation	2-45
2.6.4	Solar Water Heating	2-48
2.6.5	Pool and Spa Equipment.....	2-48
2.6.6	Pilot Lights Prohibited.....	2-50
2.7	Lighting.....	2-51
2.7.1	Kitchen Lighting	2-51
2.7.2	Bathroom Lighting	2-54
2.7.3	Recessed Lighting	2-55
2.8	Compliance Documentation	2-56
3	Prescriptive Packages.....	3-1
3.1	Introduction	3-1
3.2	Insulation	3-5
3.2.1	Ceiling Insulation	3-6
3.2.2	Framed Wall Insulation.....	3-7
3.2.3	Mass Wall Insulation.....	3-7
3.2.4	Raised Floor Insulation.....	3-8
3.2.5	Concrete Raised Floor Insulation and Below-Grade Walls	3-9
3.2.6	Slab Floor Perimeter Insulation	3-9
3.3	Glazing / Fenestration	3-10
3.3.1	Glazing / Fenestration U-factor.....	3-10
3.3.2	Maximum Glazing / Fenestration Area	3-11
3.3.3	Shading.....	3-11
3.4	Radiant Barriers	3-13
3.5	Thermal Mass (Package C Only).....	3-16
3.5.1	Slab Floor Interior Mass	3-17
3.5.2	Raised Floor Interior Mass	3-17
3.6	Space Conditioning Systems	3-20
3.6.1	Gas Systems	3-20
3.6.2	Heat-Pump Systems.....	3-20
3.6.3	Electric Resistance Heating.....	3-20
3.6.4	Other Space-Heating Systems.....	3-21
3.6.5	Space Cooling System Type	3-21
3.6.6	Refrigerant Charge and Air Flow Measurement.....	3-21
3.6.7	Thermostatic Expansion Valves	3-21
3.6.8	Setback Thermostat	3-22
3.6.9	Ducts.....	3-22
3.6.10	Documentation and Compliance	3-22
3.7	Water-Heating Systems	3-23
3.8	Compliance Documentation	3-28
4	Compliance Through Quality Construction	4-1
4.1	Duct Efficiency	4-1
4.1.1	Overview	4-1
4.1.2	Duct Location.....	4-2
4.1.3	Ducts Inside Conditioned Space	4-3
4.1.4	Ducts in Attics with Radiant Barriers	4-3
4.1.5	Duct Insulation.....	4-3
4.1.6	Duct Surface Area	4-3
4.1.7	Duct Leakage	4-4
4.1.8	ACCA Manual D Design – Duct Layout and System Fan Flow.....	4-4
4.2	Infiltration & Ventilation	4-5
4.2.1	Overview	4-5
4.2.2	Indoor Air Quality	4-5
4.2.3	Optimal Building Envelope Leakage	4-6
4.2.4	Algorithms.....	4-6
4.2.5	Blower Door Testing	4-6

4.2.6	Mechanical Supply Ventilation Requirements for Unusually Tight Buildings.....	4-6
4.2.7	Mechanical Ventilation Requirements for Low Leakage Designs.....	4-7
4.2.8	Envelope Leakage Credit for Reduced Duct Leakage.....	4-7
4.2.9	Air Retarding Wrap Credit.....	4-7
4.2.10	Reduced Duct Leakage in Combination with Air Retarding Wrap	4-8
4.3	Refrigerant Charge and Air Flow Testing	4-8
4.3.1	Overview	4-8
4.3.2	Standard Charge and Airflow Measurement Procedure	4-9
4.3.3	Alternate Charge and Airflow Measurement Procedure	4-12
4.4	Diagnostics and Field Verification	4-12
4.4.1	California Home Energy Rating Systems.....	4-13
4.4.2	HERS Required Verification and Diagnostic Testing.....	4-14
4.4.3	Installation Certification.....	4-14
4.4.4	HERS Verification Procedures.....	4-15
4.4.5	Responsibilities and Documentation.....	4-19
4.5	Procedures for HVAC System Design and Installation	4-20
5	Computer Method.....	5-1
5.1	Introduction	5-1
5.2	Compliance with a Computer Method	5-3
5.2.1	Combined Energy Budget.....	5-3
5.2.2	Combined Energy Budget: Space Conditioning and Water Heating Energy Use	5-3
5.2.3	Compliance Demonstration.....	5-4
5.2.4	Additions	5-4
5.3	General Compliance Procedure	5-5
5.4	Proposed Design Modeling Procedure	5-6
5.4.1	Building Information	5-7
5.4.2	Walls, Doors, Roofs/Ceilings & Floors	5-8
5.4.3	Fenestration	5-12
5.4.4	Shading	5-13
5.4.5	Thermal Mass	5-15
5.4.6	Infiltration/Ventilation and Reduced Building Envelope Air Leakage.....	5-15
5.4.7	Internal Gain & Thermostat Setpoints.....	5-17
5.4.8	Space Conditioning System.....	5-17
5.4.9	Ducts	5-19
5.4.10	Water Heating	5-20
5.4.11	Unconditioned Space	5-20
5.4.12	Controlled Ventilation Crawl Space (CVC)	5-21
5.4.13	Zonal Control.....	5-22
5.4.14	Radiant Barrier	5-23
5.4.15	Solar and Wood Stove Boiler Water Heating.....	5-23
5.4.16	Combined Hydronic Space/Water Heating	5-23
5.4.17	Dedicated Hydronic Space Heating	5-23
5.4.18	Building Additions.....	5-24
5.4.19	Active Solar Space Heating	5-24
5.5	Computer Method Documentation	5-24
5.5.1	Standard Reports	5-24
5.5.2	Other Forms	5-25
5.6	Standard Design Assumptions	5-33
6	Water Heating Calculations.....	6-1
6.1	Introduction	6-1
6.1.1	Water Heating Calculation Method Compliance/ Plan Check	6-3
6.1.2	Additions that Increase the Total Number of Water Heaters	6-8
6.1.3	Water Heating Inspection.....	6-8
6.2	Basic Approach	6-9
6.3	Instructions, Forms & Tables.....	6-11

6.3.1	DHW-1, Water Heating Worksheet	6-11
6.3.2	DHW-2A, Water Heating for Single Family with Multiple Heaters.....	6-13
6.3.3	DHW-2B, Water Heating for Multi-Family.....	6-14
6.3.4	DHW-3, Large Storage Gas or Indirect Gas Worksheet	6-15
6.3.5	DHW-5, Combined Hydronic Space and Water Heating.....	6-16
6.4	Case Studies	6-27
6.5	Combined Hydronic Space and Water Heating	6-31
6.6	System Descriptions	6-31
7	Additions and Alterations	7-1
7.1	Compliance Approaches for Additions.....	7-1
7.1.1	Basic Approaches.....	7-3
7.1.2	Addition Alone, Prescriptive.....	7-5
7.1.3	Addition Alone, Performance.....	7-5
7.1.4	Existing Plus Addition, Performance Only.....	7-5
7.1.5	New Construction, Prescriptive or Performance	7-6
7.2	Prescriptive Requirements for Additions.....	7-6
7.2.1	Mandatory Measures	7-8
7.2.2	Envelope Measures	7-8
7.2.3	Space Conditioning Measures.....	7-9
7.2.4	Water Heating.....	7-15
7.3	Performance Requirements for Additions	7-16
7.3.1	Mandatory Measures	7-17
7.3.2	Addition Alone Procedure.....	7-17
7.3.3	Existing-Plus-Addition Procedure	7-17
7.3.4	Default Assumptions About the Existing Building.....	7-21
7.3.5	Water Heating Performance Compliance	7-22
7.4	Documentation for Additions	7-23
7.5	Alterations	7-24
7.5.1	Introduction	7-25
7.5.2	Prescriptive Requirements	7-25
7.5.3	Water Heating.....	7-28
7.5.4	Performance Requirements.....	7-29
7.5.5	Documentation Requirements	7-30
7.6	Repairs	7-31
8	Special Compliance Topics	8-1
8.1	Multi-Family Buildings	8-1
8.2	Mixed Occupancy Buildings	8-5
8.3	Subdivisions And Master Plans	8-5
8.3.1	Compliance Requirements	8-5
8.3.2	Individual Building Approach	8-6
8.3.3	Multiple Orientation Alternative: No Orientation Restrictions	8-6
8.4	Fenestration Products	8-7
8.4.1	Fenestration Categories	8-8
8.4.2	Energy Impact	8-8
8.4.3	Fenestration Terms	8-9
8.4.4	U-factor Certification	8-11
8.4.5	U-factor for Product Specification Compliance/ Plan Check	8-11
8.4.6	SHGC Certification	8-11
8.4.7	SHGC Specification Compliance/ Plan Check	8-12
8.4.8	Fenestration Products Construction	8-12
8.4.9	Bay Windows	8-13
8.5	Wood Space Heating	8-13
8.6	Controlled Ventilation Crawl Space (CVC)	8-15
8.7	Zonal Control.....	8-17
8.8	Hydronic/Combined Hydronic Space Heating	8-19

8.9	Evaporative Cooling	8-25
8.10	Geothermal (Ground Source) Heat Pump.....	8-26
8.11	Log Homes	8-26
8.12	Straw Bale Construction	8-27
8.13	Radiant Barriers.....	8-28
9	Index	9-1

List of Figures

Figure 1-1– California Climate Zones.....	1-15
Figure 2-1 – Summary of Mandatory Measures.....	2-2
Figure 2-2 – Ceiling Insulation Construction Detail	2-6
Figure 2-3 – Cathedral Ceiling.....	2-6
Figure 2-4 – Concrete Wall Insulation	2-9
Figure 2-5 – Wall Construction Detail.....	2-10
Figure 2-6 – Brick Wall Construction Details.....	2-11
Figure 2-7 – Raised Floor Insulation	2-13
Figure 2-8 – Slab Edge Insulation	2-14
Figure 2-9 – Temporary Label	2-20
Figure 2-10 – Caulking and Weather Stripping	2-24
Figure 2-11 – Fireplace Installation	2-27
Figure 2-12 – Duct Installation (Right).....	2-39
Figure 2-13 – Duct Installation (Wrong).....	2-39
Figure 2-14 A – Connections for Nonmetallic Air Ducts and Air Connectors	2-40
Figure 2-14 B – Connections for Nonmetallic Air Ducts and Air Connectors	2-40
Figure 2-14 C – Connections for Nonmetallic Air Ducts and Air Connectors.....	2-40
Figure 2-15 A – Splices for Nonmetallic Air Ducts and Air Connectors	2-40
Figure 2-15 B – Splices for Nonmetallic Air Ducts and Air Connectors	2-41
Figure 2-15 C – Splices for Nonmetallic Air Ducts and Air Connectors	2-41
Figure 2-16 – Flexible Duct Support.....	2-42
Figure 2-17 – Hanger or Saddle Material	2-42
Figure 2-18 – Meeting Pipe Insulation Requirements for Storage Tank Water Heaters.....	2-46
Figure 3-1 – California Climate Zones.....	3-3
Figure 3-2 – Methods of Installation for Radiant Barriers.....	3-14
Figure 3-3 – Thermostatic Expansion Valve	3-22
Figure 4-1– Benefit of Thermostatic Expansion Valve	4-9
Figure 4-2– Measurement Locations for Refrigerant Charge and Airflow Tests.....	4-10
Figure 4-3 – Simplified Flowchart of the Sampling Process for Diagnostic Testing by a HERS Rater	4-16
Figure 5-1 – Example Energy Use Summary on C-2R (Page 1)	5-4
Figure 5-2 – Determining Front Orientation.....	5-8
Figure 5-3 – Controlled Ventilation Crawl Space	5-21
Figure 5-4 – Zonal Control Modeling Assumptions	5-23
Figure 5-5 – Sample CF-1R and CF2-R Forms	5-26
Figure 5-5 – Sample CF-1R and CF2-R Forms (continued)	5-27
Figure 5-5 – Sample CF-1R and CF2-R Forms (continued)	5-28
Figure 5-5 – Sample CF-1R and CF2-R Forms (continued)	5-29
Figure 5-5 – Sample CF-1R and CF2-R Forms (continued)	5-30
Figure 5-5 – Sample CF-1R and CF2-R Forms (continued)	5-31
Figure 5-5 – Sample CF-1R and CF2-R Forms (continued)	5-32
Figure 5-5 – Sample CF-1R and CF2-R Forms (continued)	5-33
Figure 6-1 – Largest Residential Energy End	6-2
Figure 6-2 – Water Heater System Energy Flow Diagram	6-2
Figure 6-3 – Wood Stove Boiler	6-34
Figure 6-4 – Point of Use.....	6-36
Figure 7-1 – Addition Alone Compliance Approach	7-5
Figure 7-2 – Existing House Plus Addition Compliance Approach	7-6
Figure 8-1 – Multi-Family Building Compliance Option	8-3
Figure 8-2 – Subdivisions and Master Plans Compliance Option	8-7
Figure 8-3 – Controlled Ventilation Crawl Space	8-16
Figure 8-4 – Zonal Control Example.....	8-18
Figure 8-5 – Hydronic Heating Heat Distribution Devices	8-21
Figure 8-6 – Space and Water Heating Capability	8-21

List of Tables

Table 1-1 – Icons Used in Document.....	1-3
Table 1-2 – Summary of Changes to Package D	1-5
Table 1-3 – Alternative to Package D (Alternative to Duct Sealing and TXV Requirements)	1-7
Table 1-4 – Building Types Covered by the Low-Rise Residential and Nonresidential Standards	1-11
Table 2-1 – Installed R-Values for Mineral Fiber Batt Insulation ¹	2-3
Table 2-2 – Default Fenestration Product U-factors (From Table 1-D of §116 of the Standards).....	2-18
Table 2-3 – Default Solar Heat Gain Coefficients (From Table 1-E of §116 of the Standards).....	2-18
Table 2-4 – Methods for Determining U-factors.....	2-20
Table 2-5 – Methods for Determining Solar Heat Gain Coefficients.....	2-20
Table 2-6 – Pipe Insulation Requirements Minimum R-value – Table 1-T from §150(j)2.....	2-45
Table 2-7 – Typical Efficacy of Electric Lighting Sources	2-53
Table 3-1 – Summary of Package D Requirements	3-2
Table 3-2 – Summary of Alternative to Package D Requirements	3-3
Table 3-3 – Summary of Package C Requirements	3-4
Table 3-4 – Notes To The Low-Rise Residential Packages	3-5
Table 3-5 – Ceiling Assembly U-factors, Wood Frame.....	3-7
Table 3-6 – Wall Assembly U-factors, Wood Frame.....	3-7
Table 3-7 – Steel Frame Wall U-factors.....	3-7
Table 3-8 – Thermal Mass Properties.....	3-8
Table 3-9 – Floor Assembly U-factors, Wood Frame	3-9
Table 3-10 – Allowed Solar Heat Gain Coefficients Used for Form S	3-12
Table 3-11 – Interior Mass Capacity Requirements for Package C.....	3-16
Table 3-12 – Interior Mass UIMC Values: Interior Mass ⁹ - Surfaces Exposed on One Side ¹⁰	3-18
Table 3-13 – Interior Mass UIMC Values: Interior Mass ⁹ - Surfaces Exposed on Two Sides ^{5, 10}	3-19
Table 3-14 – Complying Water Heating Systems ¹ – One Water Heater - No Auxiliary Credits	3-24
Table 3-15 – Complying Water Heating Systems ¹ – One Water Heater - Solar Credits ⁵	3-25
Table 3-16 – Complying Water Heating Systems ¹ – Two Water Heaters – No Auxiliary Credits.....	3-26
Table 3-17 – Complying Water Heating Systems ¹ – Two Water Heaters – Solar Credits ⁵	3-27
Table 3-18 – Reference Notes for Complying Water Heating Systems ¹	3-27
Table 4-1 – Structure of Target Superheat Temperature Table	4-11
Table 4-2 – Structure of Target Temperature Split (Return Dry-Bulb minus Supply Dry-Bulb) Table.....	4-11
Table 5-1 – General Reference Categories for Input/Output Descriptions	5-7
Table 5-2A – Standard U-factors of Wood Frame Roofs/Ceilings and Walls ¹	5-10
Table 5-2B – Standard U-factors of Wood Frame Raised Floors ¹	5-11
Table 5-2C – Standard U-factors of Wood Foam Panel Roofs/Ceilings and Walls ¹	5-11
Table 5-2D – Standard U-factors of Steel Frame Walls ¹	5-12
Table 5-3 – Descriptors for Exterior Shading Devices	5-14
Table 5-4 – Heating System Standard Design Map	5-18
Table 5-5 – Cooling System Standard Design Map.....	5-19
Table 5-6 – Crawl Space Soil Slab Heat Loss Rate (F2) Factor	5-21
Table 6-1A – Summary of System Components: Water Heaters	6-4
Table 6-1B – System Component Descriptions: Auxiliary Inputs	6-4
Table 6-1C – System Component Descriptions: Distribution Systems.....	6-6
Table 6-2 – When Are Water Heating Forms Required?	6-6
Table 6-3 – Summary of Water Heating Forms	6-10
Table 6-4 – Summary of Compliance Scenarios	6-10
Table 6-5 – Standard Recovery Load and Standard Energy Use	6-18
Table 6-6 – Distribution System Credit/Penalty ¹ for Single Family Dwellings (per worksheet)	6-19
Table 6-7 – Distribution System Credit/Penalty ¹ for Multi Family Dwellings (per worksheet).....	6-20
Table 6-8A – Basic Energy Use (BEU)* - Storage Gas Heater [no interpolation]	6-21
Table 6-8B – Basic Energy Use (BEU)* - Storage Electric Heater [no interpolation]	6-22
Table 6-8C – Basic Energy Use (BEU)* - Storage Heat Pump Heater [no interpolation].....	6-23
Table 6-8D – Basic Energy Use (BEU) - Instantaneous Gas or Electric Heaters [no interpolation].....	6-24
Table 6-8E – Jacket Loss (Indirect Gas).....	6-25
Table 6-9 – Solar Fractions Table	6-26

Table 6-10 – Wood Stove Boiler Credit Factors	6-27
Table 6-11 – Climate Zone Factors	6-27
Table 7-1– Comparison of Compliance Methods for Additions	7-4
Table 7-2 – Prescriptive Requirements for Additions	7-7
Table 7-3 – Double Glazed Skylight and Greenhouse Window U-factors for use in Compliance	7-9
Table 7-4 – Target Percent Leakage for Air Distribution Ducts Serving Existing-Plus-Addition Duct Systems	7-13
Table 7-5 – New Water Heaters Permitted in Additions – Addition Alone Compliance Method	7-16
Table 7-6 – Default Assumptions for Existing Buildings	7-22
Table 8-1 – Slab Insulation Requirements for Heated Slabs	8-23
Table 8-2 – Minimum Air Movement Requirements for Evaporative Coolers Minimum Air Movement ¹	8-26

List of Examples

Example 1-1 – Historical Buildings	1-11
Example 1-2 – Mobile Homes	1-11
Example 1-3 – Form CF-6R	1-17
Example 1-4 – Plan Checking/ Field Inspection Requirements	1-21
Example 1-5 – Administrative Regulations	1-23
Example 1-6 – Code Decisions Scenarios	1-24
Example 2-1 – Application of Mandatory Insulation Levels	2-7
Example 2-2 – Wall Insulation Scenarios	2-12
Example 2-3 – Mandatory Measures Applied to Fenestration	2-20
Example 2-4 – Decorative Gas Appliances	2-27
Example 2-5 – Setback Thermostat Requirement	2-33
Example 2-6 – Water Heater Pipe Insulation	2-46
Example 2-7 – Continuously Burning Pilot Light	2-50
Example 2-8 – Energy-efficient Kitchen Lighting, General	2-53
Example 2-9 – Non-IC Rated Incandescent Fixtures	2-56
Example 4-1 – HERS Rater Conflict of Interest	4-13
Example 6-1 – Single Family, Gas Water Heater	6-27
Example 6-2 – Single Family, Heat Pump Water Heater	6-27
Example 6-3 – Single Family, Two Gas Storage Tank Water Heaters	6-28
Example 6-4 – Single Family, Three Gas Storage Tank Water Heaters	6-28
Example 6-5 – Multi-family, Separate Gas Water Heaters for each Unit	6-28
Example 6-6 – Multi-family, Temperature Controlled Recirculation System	6-28
Example 6-7 – Single Family Addition, Replacing Existing Water Heating System	6-28
Example 6-8 – Single Family Existing, New Instantaneous Gas Water Heater	6-29
Example 6-9 – Single Family, Non-recirculating Gas Water Heater	6-29
Example 6-10 – Single Family, Existing+Addition, Electric Water Heater	6-29
Example 6-11 – Single Family, Replacement Gas Water Heater	6-29
Example 6-12 – Residential Building, Gas to Electric Water Heater	6-29
Example 7-1 – Prescriptive Requirements – Additions Less than 100 ft ²	7-8
Example 7-2 – Reuse of Windows	7-8
Example 7-3 – Accounting for Greenhouse Windows	7-9
Example 7-4 – Radiant Barriers in Additions	7-9
Example 7-5 – Existing Electric Resistance Heaters	7-11
Example 7-6 – Refrigerant Charge and Airflow or TXV in Additions	7-11
Example 7-7 – Duct Sealing in Additions – Extending a Duct from an Existing System	7-14
Example 7-8 – Refrigerant Charge and Airflow or TXV in Additions	7-17
Example 7-9 – Existing-Plus-Addition Analysis Using an Approved Computer Method	7-19
Example 7-10 – Refrigerant Charge and Airflow or TXV in Additions	7-19
Example 7-11 – Duct Sealing in Additions – Compliance Credit for Sealing Existing Ducts	7-20
Example 7-12 – Radiant Barriers in Additions	7-20
Example 7-13 – Moving Existing Windows	7-26
Example 7-14 – Alteration with New Windows	7-26
Example 7-15 – Replacing windows	7-26
Example 7-16 – Adding a greenhouse window to an existing building	7-26
Example 7-17 – Alteration of Existing Duct System	7-27
Example 7-18 – New Air Handler and Plenum Platform	7-27
Example 7-19 – Replacing HVAC System	7-28
Example 7-20 – Replacing Water Heaters	7-29
Example 7-21 – Modeling Existing-plus-Alteration	7-29
Example 7-22 – Buildings Damaged by Natural Disasters	7-31
Example 8-1 – Multi-Family Building Compliance, Examples	8-3
Example 8-2 – Multi-Family Building Duct Testing	8-4
Example 8-3 – Multiple Orientations	8-7
Example 8-4 – Pellet Stoves	8-15

Example 8-5 – Wall Installed Wood Stove	8-15
Example 8-6 – Laundry Room and Bathroom Zoning	8-19
Example 8-7 – Zonal Control Credit	8-19
Example 8-8 – Dedicated Hydronic-heating System.....	8-24
Example 8-9 – Slab edge Insulation Requirements	8-24